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March 10, 2011

Senator Alan Olson  
Chairman, Senate Energy and Telecommunications Committee  
Montana Senate  
PO Box 200500  
Helena, MT 59620-0500

**Re: HB 237, Revise definition of eligible renewable resources**

Dear Senator Olson and Energy and Telecommunications Committee Members:

I am an independent, consulting Professional Engineer located in Helena. Much of my career has been spent in the wood products and, in particular, the treated wood industry. I currently am a member of and do work for the Western Wood Preservers Institute (WWPI) and the Treated Wood Council (TWC), representing respectively the western and national interests of the North American wood preserving industry. Additionally, I am a member of the Western Environmental Trade Association (WETA) and an officer in the Montana Society of Engineers.

I have long been a supporter of utilizing biomass for energy and I commend you for supporting efforts to allow various small producers of energy from alternative sources to take advantage of benefits available to producers of "renewable" energy. Unfortunately, current law includes language that unnecessarily limits the potential use of a category of biomass; treated wood.

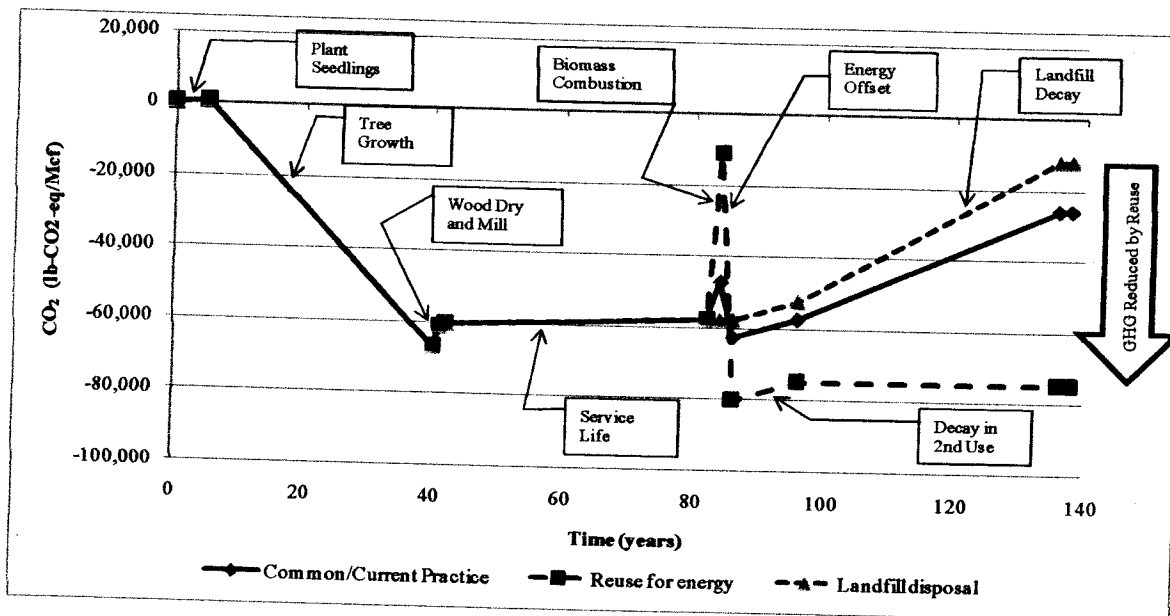
Wood products are treated with preservative formulations to meet a variety of primary uses and wood species limitations. For example, creosote is the primary preservative for railroad ties, pentachlorophenol-in-oil for utility poles, copper for deck lumber, and borate for interior framing in termite or decay hazard area construction. Following primary service, disposition may include other secondary uses (ties used as fence posts, for example), disposal in landfills, or reuse to produce energy. Such products have valuable energy generally equal to or better than green biomass. However, the preservative chemistries also present challenges to energy conversion that are real, but that can be met through appropriate use of combustion or gasification technologies, emission controls, and permitting. Current regulations already require that such facilities obtain fuel specific emission permits and permit writers are diligent in ensuring that emissions will not adversely impact neighbors or the environment. Thus, the legislative exclusion prevents beneficial reuse of a valuable resource while, at the same time, causing more biomass to be disposed in landfills where decay causes the release methane, a potent climate changing gas.

Accordingly, I request that HB 237 be revised to include the language shown below:

Section 69-3-2003 Definitions (8) "Eligible renewable resource" means a facility either located within Montana or delivering electricity from another state into Montana ... that produces electricity from one or more of the following sources:

(g) ~~low emission, nontoxic biomass based on dedicated energy crops, animal wastes, demolition debris, or solid organic fuels from wood, forest, or field residues, except that the term does not include wood pieces that have been treated with chemical preservatives such as creosote, pentachlorophenol, or copper-chrome-arsenic but only at facilities that~~ (a) possess the technology to satisfy all pertinent environmental requirements and (b) obtain the necessary permits for such use;

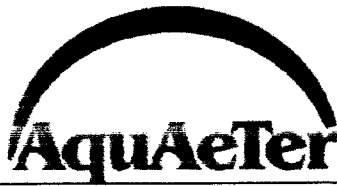
I recently wrote an article for the WWPI that used life cycle assessment procedures to consider the implications of using out-of-service preserved wood for energy versus landfill disposal. Each one thousand cubic feet of preserved wood that is recycled for energy can offset approximately 49 barrels of imported oil, resulting in lower emissions of green house gases. The figure below shows the benefit clearly. A copy of this report is attached for your reference.



The potential benefits of using preserved wood following primary service for energy should not be excluded unnecessarily by legislation. Potential projects utilizing treated wood as biomass fuel should not be stopped by law before even being given a fair hearing. The existing air emissions permitting process effectively prevents unsafe or inappropriate uses. I encourage you to make this simple, logical revision to Montana law.

Sincerely,

*Stephen T. Smith*  
Stephen T. Smith, P.E.



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**Summary Report**  
**End-of-Life Management of Preserved Wood**  
**The Case for Reuse for Energy**  
*November 2010*

Wood products are treated with wood preservatives to extend their service lives in weather-exposed or wet environments, or in environments subject to microbial and insect attack. Preservatives allow products that would otherwise fail within months or years to last from decades to nearly a century. A preserved wood product's service life continues until the product, or the structure in which it is a part, must be replaced. Outdoor decking may have a service life from five<sup>1</sup> to 30 years, utility poles from 15<sup>2</sup> to nearly 100 years, and railroad ties from 10<sup>3</sup> to 60 years. Service life depends on factors including the exposure environment, applied loads, product quality, maintenance, and user preferences. Most carbon in the preserved wood product is stored at least until the end of its service life. Following primary service, some preserved wood products can be reused in less demanding applications, such as poles being used for fencing, thereby further extending their service lives. Eventually all preserved wood products must be removed. End-of-life management options for those removed preserved wood products generally include abandonment at use sites, disposal in non-hazardous landfills, or reuse as an energy source.

Wood preservatives are approved for use by the United States Environmental Protection Agency (EPA). The EPA has allowed end users of such products to make end-of-life management decisions for preserved wood products without hazardous waste restrictions. The end-of-life disposition option chosen has environmental implications, and environmental improvement opportunities are available through the proper management of preserved wood at the end of life. This paper summarizes the energy and greenhouse gas (GHG) ramifications of end-of-life management options<sup>4</sup>.

The cradle-to-grave life cycle of preserved wood products is similar to other wood products and agricultural products. Seeds sprout and grow using photosynthesis to extract carbon dioxide (CO<sub>2</sub>) from the atmosphere to create hydrocarbon mass; the mature tree is harvested and converted through manufacturing processes into useful products, which serve their desired function; and then end-of-life disposition options result in some of the embodied carbon being returned to the atmosphere and some being sequestered in long-term (hundreds of years) storage. Instead of "ashes to ashes," the cycle is CO<sub>2</sub> to CO<sub>2</sub>.

<sup>1</sup> Typically a result of home improvements that result in deck removal and not due to product failure.

<sup>2</sup> Typically a result of road widening projects and not product failure.

<sup>3</sup> Typically a result of track realignment and not product failure.

<sup>4</sup> Complete evaluation by Smith, S.T. and Bolin, C.A. 2010 entitled End of Life Management of Treated Wood is available on the WWPI website at [www.wwpinstitute.org](http://www.wwpinstitute.org).

On average, dry wood mass is approximately 48% carbon. Each cubic foot of wood contains approximately 15 pounds of carbon representing 55 pounds of carbon dioxide removed from the atmosphere.

Estimated annual preserved wood production in the U.S. is approximately 640,000 Mcf (1Mcf = 1,000 cubic feet)<sup>5</sup>. Annual production volumes by preservative type are estimated to be 87,000 Mcf for creosote, 32,000 Mcf for oil-borne treatments, and 520,000 Mcf for water-borne treatment. In addition, approximately 2,400 Mcf of lumber and plywood is protected with fire retardant<sup>6</sup>.

According to USEPA's AP-42, Compilation of Air Pollutant Emission Factors, wood has a fuel value of approximately 9,000 BTU per pound of dry (zero moisture content) wood mass. The effective heat value is reduced by the amount of water in the wood since water must be evaporated and heated to exhaust gas temperature in a combustion process. Moisture content for wood is traditionally stated on a dry-wood basis, which is equal to the weight of water divided by the dry weight of wood. Green sapwood biomass typically contains approximately 100 percent moisture or more. At 100 percent (meaning one part water for each part dry wood mass), the contained heat is approximately 4,500 BTU per pound and the effective heat content (after heating and evaporating the water) of wood fuel is approximately 3,200 BTU per pound. Used preserved wood is typically drier than "green" wood. While it can vary greatly depending on its previous use and storage conditions, the moisture content is typically about 20 percent. Wood fuel at this moisture content has effective heat value of approximately 7,200 BTU per pound.

Based on AquAeTer's representative model, including a mix of wood species, wood preservatives either have no impact or add to the heat value when used as fuel. The heat value of wood products typically preserved with water-borne and oil-borne preservatives is approximately 7,000 BTU/pound and for creosote preserved hardwood is approximately 8,000 BTU/pound. As part of the end-of-life management assessment, AquAeTer prepared a simplified cradle-to-grave life cycle inventory (LCI) to model end-of-life alternatives for preserved wood. The end-of-life scenarios are summarized in Table 1.

**Table 1 - End-of-Life Scenarios**

End-of-life option	Common/Current Practice	Reuse for energy	Landfill disposal
Scenario No.	1	2	3
Secondary use with decay in place	10%	10%	10%
Reuse to energy	20%	90%	0%
Landfill disposal	70%	0%	90%

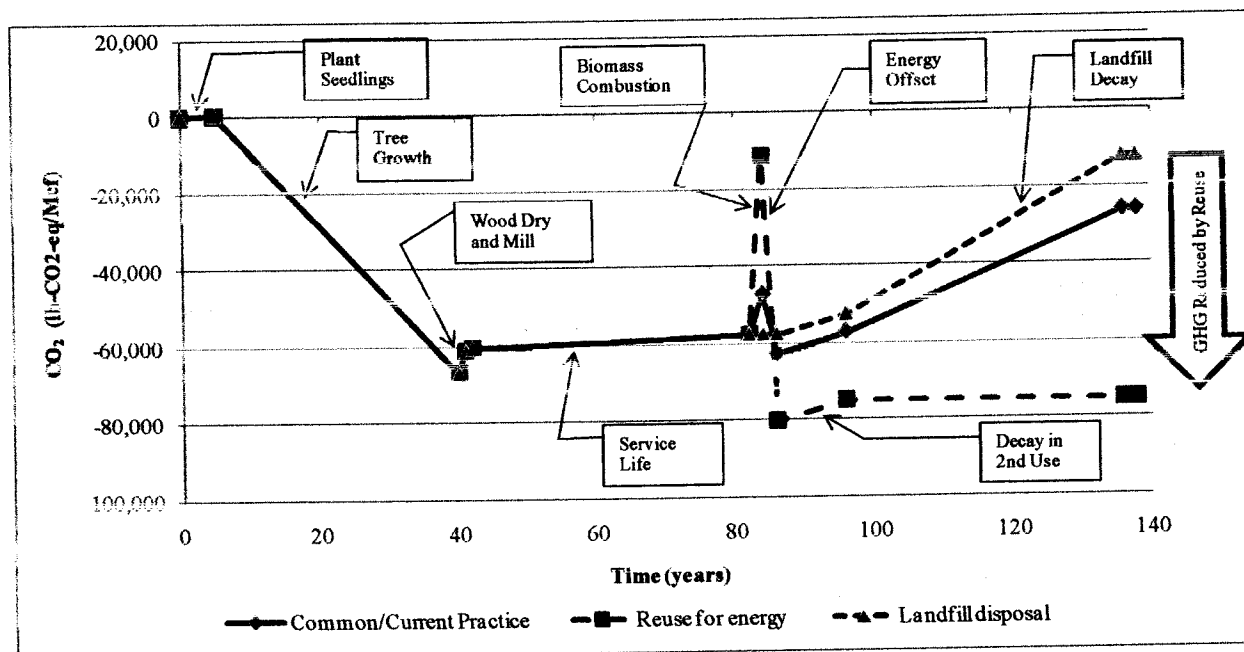
The total cradle-to-grave GHG balance, including contributions and credits from both fossil and biogenic sources is presented in Figure 1. The GHG balance is presented in units of pounds of

<sup>5</sup> Smith, S.T., 2009. Economics of Treated Wood Used in Aquatic Environments. Chapter IV in Book "Managing Treated Wood in the Environment" J.J. Morrell, K. Brooks, T. LaDoux, and D. Hayward to be published by WWPI in 2010.

<sup>6</sup> Vlosky, Richard P. 2009. Statistical Overview of the U.S. Wood Preserving Industry: 2007. February 16, 2009.

CO<sub>2</sub>-equivalent per Mcf of preserved wood. Sawdust and other by-products from milling are used for energy, resulting in energy offsets. Following service life, each of the three disposition scenarios are tracked separately. The baseline represents approximately the average mix of disposition choices currently applied to the overall preserved wood market. The reuse and landfill options represent the possible extremes of choices with all preserved wood going to one or the other disposition options so that differences can be highlighted. The reduction in GHG emissions associated with reuse of preserved wood for energy amounts to approximately 70,000 pounds of CO<sub>2</sub>-eq. per Mcf of preserved wood, compared to a reduction of approximately 10,000 pounds under the landfill scenario. The difference between the two options is highlighted by the arrow on the right side of Figure 1.

**Figure 1 - Total (Biogenic and Fossil) GHG Balance for Preserved Wood**



All scenarios result in reduction, rather than increase, of GHG over the life cycle of a preserved wood product. GHG accounting includes offset credits for the beneficial use of by-product bark and sawdust for process heat and energy production. The energy credits are equal and opposite to an equal heat value that would have been needed from non-renewable fossil fuel use (e.g., use of biomass fuel in a boiler instead of natural gas use).

Preservative chemicals (in preserved wood) combusted with biomass fuel need not result in higher or more hazardous emissions in comparison to other fuels. The carbon-based preservatives, such as creosote and pentachlorophenol, are destroyed by combustion in appropriate combustion devices. Metals, such as copper, chromium, arsenic, and boron, are effectively controlled by appropriate combustion and control equipment and operating procedures. It is the appropriate matching of combustion conditions and equipment with the fuel being used that affects emissions.

The beneficial reuse of preserved wood products as a non-fossil source of energy, following primary service life, is currently underutilized. Although many preserved wood products are

being reused for energy, such as combustion systems, kiln fuel or gasification, significant increased market reuse of treated wood products is possible.

The energy contained in 640 million cubic feet (estimated annual production) of preserved wood is equivalent to approximately 32 million barrels of oil. If beneficially used, the energy would offset the fossil fuel use of approximately 646,000 U.S. citizens or about 0.21 percent of total U.S. fossil fuel use.

Since the CO<sub>2</sub> emissions from wood, a biogenic fuel, are neutral regarding GHG emission impacts, use of this fuel reduces GHG compared to use of equivalent amounts of fossil fuel. The offset to GHG associated with the full utilization of 640 million cubic feet of preserved wood is equal to the annual per capita GHG emissions of approximately 870,000 U.S. citizens or about 0.29 percent of the U.S. total GHG output.

The impact on U.S. landfill capacity is large. Disposal in landfills of 640 million cubic feet of preserved wood equates to approximately nine percent of annual U.S. landfill disposal volume.

Exploiting the end-of-life value of preserved wood would thus provide an expanded energy source while lowering GHG emissions and reducing landfill requirements. Federal, State, and regional governments and agencies should encourage and reward beneficial reuse of preserved wood following removal from service. Recommended actions toward this end include:

- Include preserved wood that has been removed from service within the definition of "biomass" in any laws or regulations. Any incentives used to encourage use of renewable biomass at approved or permitted facilities should apply equally to preserved wood biomass.
- Repeal laws that prevent or ban the use of preserved wood for energy.
- Do not pass laws that would regulate preserved wood removed from service.